

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

INTRODUCTION

This chapter describes the environment affected by the proposed action and alternatives and the predicted impacts of the proposed action and alternatives. The discussion is organized by the resource issues described in Chapter 1. The affected environment (or present condition or characteristics of the resource) is discussed first under each resource issue. This is followed by a description of the predicted impacts of the proposed action alternative and no action alternative. Direct, indirect and cumulative impacts have been considered. The environmental impacts are summarized in Table 3.2 at the end of the chapter.

CULTURAL RESOURCES

Description of the Affected Environment

Archaeological Overview - The archaeology of Clear Lake began approximately 8,000 to 10,000 years ago. During the 1992 drought, surface collections near the edge of the east lobe of Clear Lake recovered stemmed spear points, crescents, and other stone tools (West and Welch n.d.). These artifacts were dredged from beneath the floor of the reservoir in 1931, during trenching. Such materials are characteristic of the early Holocene period, which archeologists have termed the *Western Pluvial Lakes Tradition*.

The archeological record at Clear Lake also consists of a number of large and complex prehistoric sites. These sites vary, but contain large numbers of milling tools (specialized tools for plant processing), activity areas (indicating internal organization), hearths, and distinctive artifact clusters. Sites are distributed along the fringe of marsh land that existed in the east lobe of Clear Lake prior to the construction of the dam and along the original shoreline of Clear Lake.

Portions of Clear Lake have been inventoried for archeological sites. Squire and Grosscop recorded several sites along Clear Lake in 1953 and 1955. The U.S. Fish and Wildlife Service (Raymond 1991) and Reclamation completed more recent work during the 1991-1992 drought period and recorded a number of sites including the stemmed spear point site mentioned above. A prehistoric cemetery was among the sites discovered. Reclamation, in consultation with the Klamath Tribes, capped the cemetery to protect it from vandalism and erosional damage. None of these sites is located near Clear Lake Dam.

Site-specific cultural resource surveys were conducted by Reclamation archaeologists in 1999 for potential material borrow areas adjacent to the dam. Inventory revealed the presence of two small lithic scatters and one circular arrangement of volcanic cobbles within Contractor Use Area No. 4. A small lithic scatter and a circular cobble ring are found within Contractor Use Area No. 3. Reclamation believes that the two lithic scatters in Area No. 4 are ineligible for inclusion in the National Register of Historic Places (NRHP), although final determination awaits consultation with the Klamath Tribes and the SHPO. The rock circle will be avoided through redesign of potential borrow activity and will not be affected. The cobble ring and lithic scatter in Area No. 3 will be avoided. No resources were noted in the foot print of the new RCC dam.

Ethnographic Overview - The Modoc Indians were the people who occupied Clear Lake at the time of European contact. Seasonally, they fished the run of Lost River and shortnose suckers on the Lost River and its tributaries. The Modoc clearly used a wide range of plant foods from the marsh lands, hinted by the large number of milling stone implements found in archeological sites within the current reservoir. Hunting and fishing were also an important part of their survival.

Ray (1963), who compiled ethnographic information on the Modoc, reports three villages, two “cremation places” and one “ritual center” at Clear Lake. Examining the Ray’s maps, it is clear that these areas are located several miles from Clear Lake Dam.

Historic Overview - The region, although remote and isolated, was visited by fur trappers and government explorers in the early to mid-nineteenth century. Within a few short years, overland emigrants began to move into the Klamath River region along newly developed wagon roads and trails. Occupation of the Klamath Basin was encouraged by a series of Federal incentives to provide land to settlers. The Preemptive Act, 1862 Homestead Act, and the Swamp Land Act all sparked interest in the basin and elsewhere in the West. However, settlement remained sparse until after conclusion of the Modoc War in 1873. Ranching, logging and farming became the main economic pursuits in the Klamath Basin, although settlements were far apart and business was slow to develop.

Early farmers recognized that the region's agricultural potential was limited by low precipitation. Several early irrigation canals were completed to provide reliable water. Several canals operated, either draining lower Klamath Lake or working a saw and flour mill at Link River near Klamath Falls. Other ditches were constructed on Lost River and Lower Klamath Lake and two more off Link River. Ultimately, rights to all existing canals were acquired by the Federal government.

Scant historical information related to the early settlement of the Clear Lake watershed is available. Water rights postings were made as early as 1875, according to Modoc County records. General Land Office records indicate that many of the initial applications for homestead entry were canceled or relinquished. With the exception of the Applegate Emigrant Trail that purportedly crosses the area, (on some early maps and drawings this feature is described only as a dike) few roads were developed and no settlements were established. The Carr Ranch, established in later half of the 19th century, included lands that would form the entire east lobe of Clear Lake as well as property around the perimeter of the west lobe. For many years, large numbers of cattle grazed within the reservoir basin.

Investigations by the Federal Reclamation Service were initiated in 1903 and construction on the Klamath Project was begun in 1906. Development of Clear Lake Dam was initiated in 1908 to provide reliable water to users along the Lost River and to assist in reclaiming Tule Lake. The dam work force included Austrians, Serbians, and later, Bulgarians. Troubles were encountered at the dam site from porous volcanic rock, cold winter weather, and shortage of labor. Workers deserted the project because they received higher wages from farmers during harvest. Clear Lake Dam was finally completed in 1910.

Clear Lake Dam contains no inherent or unusual design characteristics. The dam is an ordinary rubble fill, rock face dam. The only concrete element visible on either face of the dam is the outlet works tower. The dam, nevertheless, is an important part of the Klamath Project since it allowed for agricultural development in Langell Valley and for reclamation of Tule Lake. As a component of the project, the dam contributed to the settlement and development of the general Klamath Basin region. Consequently, Clear Lake Dam is considered eligible for inclusion in the NRHP under criterion “a”. The SHPO concurred with this determination.

Environmental Impacts

Proposed Action Alternative - Under this alternative, all construction-related impacts would occur in the immediate vicinity of the existing dam. The area within the floodplain of the Lost River was previously disturbed by periodic flood scouring prior to construction of Clear Lake Dam. The area was further disturbed during construction of the original dam. Cultural resource surveys have been conducted by Reclamation archaeologists for borrow areas on adjacent terraces. If the two lithic scatters found in Area No. 4 are formally determined ineligible for inclusion in the NRHP, then, according to regulations, development of either of these borrow areas would result in "no historic properties affected." The rock ring will be avoided. Other known sites at Clear Lake are outside of the areas that would be directly or indirectly affected by the proposed project.

It is doubtful that both of the proposed borrow areas (Area No. 3 and 4) would be impacted by construction of the RCC structure. The contractor would have discretion to use on-site material or importing material from off-site. If material is brought to the site, then none of the lithic scatters noted above will be destroyed. Importing material would require maintaining the existing access road to the dam. All road maintenance would occur within the existing road prism. If this is done, then no inventories are needed because maintenance activities would not conflict with cultural resources located adjacent to the access road.

Clear Lake Dam would be adversely affected by construction of the RCC structure. The RCC structure and removal of a portion of the existing embankment would adversely affect its NRHP status. Mitigation measures would be determined in consultation with the California SHPO.

No Action Alternative - This alternative would result in loss of the dam and the impacts to the dam would be irreversible and irretrievable. Damage to the dam would preclude it from inclusion in the NRHP. The lowering of the lake level as a result of the elevation restriction would result in sites under the lake being exposed and vulnerable to looting and vandalism. Failure of Clear Lake Dam would compromise its NRHP status. If dam failure resulted in a large uncontrolled release of water from Clear Lake, archeological and historical sites would be adversely affected by wave action and scouring downstream. Unprotected sites could be irreversibly impacted.

THREATENED AND ENDANGERED SPECIES

Description of the Affected Environment. Two federally-listed endangered fish, the Lost River and shortnose suckers inhabit Clear Lake and the Lost River. The shortnose sucker (*Chasmistes brevirostris*) and the Lost River sucker (*Deltistes luxatus*) are native and exclusive to the Upper Klamath River basin. They historically were abundant, but are now uncommon. Both species were listed as endangered under the Endangered Species Act in 1988. Upper Klamath Lake, Tule Lake, Gerber Reservoir, Clear Lake and the Klamath River reservoirs (Keno, J.C. Boyle, Copco, and Iron Gate) are habitats for the endangered Lost River and shortnose sucker. These sucker species colonized the Klamath River reservoirs as they were constructed. Both endangered sucker species are predominantly lake-dwelling, and therefore depend heavily upon satisfactory lake water quality conditions for long-term population viability. The suggested reasons for their endangered status includes the damming of rivers, dredging and draining of marshes, water diversions, hybridization, competition and predation by exotic species, insularization of habitat, and water quality problems associated with timber harvest, removal of riparian vegetation, livestock grazing, and agricultural practices.

Clear Lake supports the healthiest populations of endangered suckers in the Klamath Project area. This is due largely to the lack of algal blooms and the good water quality of Clear Lake, compared to other water bodies in the Project (Reclamation 1994). Clear Lake is turbid, or cloudy. This turbidity is caused by frequent mixing of small colloidal particles. The lake lacks shoreline development and is shallow. It also has low biological productivity with small blue-green algae blooms during the summer months. Shoreline areas lack emergent vegetation and submerged aquatic plants are limited to a few sites protected from the wind. During summer, water temperatures get quite warm (< 27° C) but other factors, including dissolved oxygen and pH, are adequate for fish (Reclamation 1994). Ice cover can occur for up to three months during the winter; however, water quality conditions remain good under the ice (Reclamation 1994).

Spawning habitats in the Clear Lake watershed occur in Willow and Boles Creeks where shortnose and Lost River suckers migrate during the late winter and early spring months to spawn (Buettner and Scopettone 1991, Scopettone et al. 1995). Extended rearing of juvenile suckers has also been documented in the tributaries. About one mile of the Lost River, downstream of Clear Lake Dam has been proposed as critical habitat for the Lost River and shortnose suckers.

Releases from Clear Lake typically occur from April through October for irrigated agricultural activities. From November through March, no water is released except for flood control purposes. Fish passed through Clear Lake Dam are not able to reenter Clear Lake. In 1993, a large mesh barrier net was installed around the dam outlet works to restrict juvenile and adult suckers from leaving the lake during the irrigation season. Reclamation conducts endangered sucker salvage operations downstream from the dam after irrigation releases are ended in the fall.

Fish populations occur in the Lost River and Malone Reservoir below Clear Lake. These populations have probably reached the carrying capacity of each system. Low water conditions in the fall and winter play an important role in limiting fish populations.

Currently, due to flood control considerations, a maximum carryover of 350,000 acre-feet is allowed in Clear Lake on October 1 annually, or elevation 4536.4 feet. This flood control limit is raised to 374,000 acre-feet on March 1, or elevation 4537.4 feet. The lake is allowed to store up to 450,000 acre-feet exclusively for flood control, but it must be lowered as soon as possible to the 374,000 acre-feet limit. At elevation 4535.0 feet, the lake is approximately 22,900 acres in size. Pursuant to the 1992 and 1994 Biological Opinions, water storage below elevation 4521.0 ft. (45,480 acre-feet) is not useable. The 1994 Biological Opinion established a minimum lake elevation of 4519.0.

Environmental Impacts

Proposed Action Alternative - Construction of the RCC structure could result in impacts to the endangered suckers through: (1) introduction of contaminants into waters where suckers are present in either Clear Lake or the Lost River; (2) disturbance or modification of proposed critical habitat downstream from the dam or; (3) partial removal of the existing embankment structure.

Contaminants such as gasoline or diesel fuel, oil, grease, concrete and sediment could be accidentally released into Clear Lake and/or the Lost River as a result of construction-related activities (such as equipment operation, vehicle fueling and servicing, fuel storage, sediment generated by construction) in the proximity of these water bodies. Accidental spills of these substances could occur that may find their way into the lake or river.

The Lost River downstream from Clear Lake Dam is proposed critical habitat for the endangered suckers. Approximately 200 feet of the Lost River downstream from the existing embankment structure may be disturbed by construction-related activities such as construction of a cofferdam, vehicle crossings and construction of the RCC structure. These activities would result in disturbance or modification of a short reach of the river channel.

The existing embankment would be partially removed when the RCC structure is completed. Construction activity associated with removal could impact endangered suckers in Clear Lake through localized sediment generated by the breaching, physical disturbance of fish habitat, contact with excavation equipment due to noise, vibration and light changes during construction, or harm to individual suckers in the lake as material removed from the embankment structure may fall back into the water.

The following measures will be implemented, as required, to mitigate impacts on the endangered suckers and/or their proposed critical habitat:

Construction specifications will include restrictions and requirements for fuel storage, fueling and spill prevention/containment.

- No fuel storage, fueling, vehicle/equipment service areas will be allowed within the floodplain or any other location where contaminants could reach either Clear Lake or the Lost River downstream from the dam.

- No overnight vehicle parking of heavy equipment or other vehicles allowed within the Lost River floodplain downstream from the dam.

- Regular field inspections of environmental commitments will be conducted by Reclamation.

- Reclamation would salvage endangered suckers downstream from the dam prior to construction activities.

- A barrier net would then be placed in the Lost River to prevent endangered suckers from moving back upstream into the portion of the river within the construction area.

- Reclamation will designate a “no disturbance” zone downstream from the dam to minimize the area impacted by construction-related activities.

- Fence the downstream floodplain area adjacent to the Lost River during/after construction is completed to protect proposed critical habitat.

- Partial removal of the existing embankment will start on downstream side of embankment and progress toward the upstream side.

- Barrier nets will be placed upstream of existing embankment structure during crest removal activities.

- Water will be pumped to the downstream side of existing embankment to equalize water levels during partial removal of the existing embankment.

Clear Lake would not be lowered to construct the RCC structure. Operation of the dam would be unchanged during construction and downstream deliveries of water would not be interrupted during construction. Reclamation would operate the RCC structure to meet the operational requirements for Clear Lake and the Lost River pursuant to the Endangered Species Act until the new biological opinion on operation of the Klamath Project is completed later this year. Clear Lake Dam would then be operated in accordance with that opinion. A fish screen would be incorporated into the design of the RCC structure, or the mesh barrier net would be re-installed to prevent juvenile and adult suckers from leaving the lake through the dam outlet works during the irrigation season.

This alternative would likely result in effects on endangered suckers. Those effects would be localized, temporary and short-term. Reclamation will consult with the Service under Section 7 of the Endangered Species Act. No construction activities would be initiated prior to completion of the Section 7 consultation.

No Action Alternative - Under this alternative, the endangered suckers would be adversely affected (Fish and Wildlife Service 1999). Water levels in Clear Lake would be significantly lowered as a result of a reservoir elevation restriction. If the dam failed, the lake would drain to approximately elevation 4522 or lower. Evaporation would be expected to lower the lake level even more. The east lobe of the lake would be dry, retaining the original west lobe of the lake. Fish would be concentrated into either a smaller lake area or entrained out of the reservoir during draining or evacuation. If fish are entrained, they would be in the Lost River and possibly Malone Reservoir, where fish populations are probably already at carrying capacity. The entrained fish would either die or compete with downstream resident fish for food and space. It is possible that thousands of endangered suckers would perish.

WETLAND AND RIPARIAN AREAS

Description of the Affected Environment. Clear Lake Dam is at the head of the Lost River. Wetland and riparian areas on either side of the Lost River downstream from the dam are influenced by water releases from Clear Lake Dam. After the irrigation season ends (usually mid-October) water releases to the river are ended. Deep pools remain in the river and the riparian areas are generally unaffected because vegetation is dormant during this period. The area downstream of the existing dam was surveyed and mapped for vegetation and wetlands in May 1999 (Reclamation 1999a). Site characterization for each of the potentially disturbed areas was based on the technical guidelines and methods for determining jurisdictional wetlands according to the 1987 Corps of Engineers Delineation Manual. Table 3.1 summarizes the results of the wetland evaluation.

**Table 3.1 - Wetlands
Clear Lake Dam Safety of Dams EA**

Area	Site Characterization	Vegetation	Location	Size
Contractor Use Area No. 3	Non-wetland	Dominated by upland plant species such as <i>Artemesia sp.</i> (Sagebrush), <i>Juniperus sp.</i> (Juniper), <i>Chrysothamnus sp.</i> (Rabbitbrush)	Terrace near left abutment of dam	4.0 acres
Contractor Use Area No.4	Non-wetland	Dominated by sagebrush (<i>Artemesia sp.</i>) and rabbitbrush (<i>Chrysothamnus sp.</i>)	Terrace near right abutment of dam	7.0 acres
Lost River floodplain d/s from existing dam (location of RCC dam)	Wetland; palustrine, emergent, flooded	<i>Salix sp.</i> , willow <i>Juncus sp.</i> Sedge <i>Agrostis sp.</i> bent grass	Immediately downstream from existing dam	0.9 acres

Environmental Impacts

Proposed Action Alternative - Under this alternative, approximately 0.9 acres of palustrine emergent wetland would be impacted by construction of the RCC structure. The following mitigation commitment apply to this impact. Construction of the RCC structure would require a Corps of Engineers Clean Water Act-Section 404 Permit/State Stream Alteration Permit for discharges of dredged or fill material into the waters of the United States. Such activities associated with this project would include construction of the RCC structure and expansion of the impact “footprint” of the dam. The necessary permits and authorizations would be acquired by Reclamation prior to initiation of construction activities. The conditions and requirements of the 404 Permit will be strictly adhered to by Reclamation. Reclamation would fully mitigate any loss of jurisdictional wetland with appropriate in-basin, in-kind mitigation as determined in consultation with the U.S. Army Corps of Engineers, the State of California and required as a condition of a 404/stream alteration permit. Reclamation would implement adequate wetland mitigation to fully compensate for any impacts to the waters of the United States. Reclamation will coordinate with the U.S. Forest Service, U.S. Fish and Wildlife Service and California Department of Fish and Game in identifying mitigation sites and developing suitable wetland mitigation measures for this impact. Such measures could include restoration of degraded wetlands, riparian livestock fencing or wetland creation.

No Action Alternative - This alternative would result in a loss of wetlands and riparian areas along the Lost River and around the perimeter of Clear lake as a result of lowering the elevation of Clear Lake due to the elevation restriction or failure of the dam. Flows in the Lost River would be dramatically reduced with water remaining only in deep pools.

LIVESTOCK GRAZING

Description of the Affected Environment. The U.S. Forest Service manages the land on either side of the river as a range allotment for cattle. The allotment is used from May until September. Cattle are managed to protect other resources by such methods as riparian fencing and rotational grazing. The road across the dam is used by the range permittee to herd cattle from

one side of the dam to the other. During low water, the cattle can cross the Lost River, and are not dependent on the road.

Environmental Impacts

Proposed Action Alternative - Under this alternative, livestock grazing would not be affected. There would be temporary, short-term construction activities on a relatively small area around the project area. Permittee access would be allowed through the construction area. There would be temporary displacement of livestock away from the construction activities for up to nine months.

No Action Alternative - Under this alternative, livestock grazing would be affected during the active grazing season of the allotment. Riparian areas subject to livestock grazing would be reduced as a result of the lowered lake elevation or scoured due to flooding if the dam failed. The grazing allotment could be affected by road closures following failure of the dam.

CLEAR LAKE NATIONAL WILDLIFE REFUGE

Description of the Affected Environment. Clear Lake National Wildlife Refuge was established by President William Howard Taft on April 11, 1911 via Executive Order Number 1332 as "Clear Lake Reservation" to serve, "... as a preserve and breeding ground for native birds." The refuge includes 33,440 acres, of which 23,770 acres is open water and 9,670 acres is upland habitat (such as perennial grasses, forbs, low sagebrush, and juniper). The refuge supports colonies of California and ring-billed gulls, great blue heron, great egret, Caspian tern, double-crested cormorant, and the largest nesting colony of American white pelicans in California. The refuge also serves as one of the few breeding sites for sage grouse in the area. A summary of the key biological resources of the refuge follows:

Threatened and Endangered species - The refuge supports one of the largest populations of Lost River and shortnose suckers in the Klamath Basin, as discussed previously in this chapter. Bald eagles are frequently sighted on the refuge, with a peak population of seven birds. Peregrine falcons are occasionally sighted during the fall and spring water bird migration.

Sensitive Species Production - Clear Lake Dam was originally constructed to hold Lost River water in the upper watershed where much of it would evaporate, thereby easing the reclamation of historic Tule Lake. Water levels are presently regulated in the lake for flood control and irrigation with minimum lake elevations dictated by the 1994 Biological Opinion to protect the Lost River sucker and shortnose sucker. A minimum water level of 4521 feet is mandated for October 1, with an absolute minimum of 4519 feet.

The refuge represents one of the last two breeding colonies of white pelicans in California (the other is at Lower Klamath Lake National Wildlife Refuge). These birds are attracted to the refuge because of the availability of secure isolated nesting islands. Several of these islands act as primary nesting sites for a variety of colonial nesting waterbirds. Each island or series of islands is optimized for nesting under different lake levels. The following narrative is from a letter to Russell Peterson, Oregon State Supervisor, USFWS dated November 11, 1994 from Leopoldo Moreno, Ph.D. Candidate, U.C. Davis. Leopoldo conducted his doctoral research on white pelican ecology in the Klamath Basin.

“At Clear Lake, the location of white pelican colonies varies with the availability of nesting islands, which in turn are formed by water level fluctuations. The timing of island formation and their continued separation from major land masses is crucial for the success of ground-nesting waterbirds, especially during egg-laying and incubation when colonies are most vulnerable to predation by coyotes and racoons. White pelicans have been recorded nesting at Clear Lake in four different locations depending on water conditions: Main Island, Rocky Islands, Bird Island and Northwest Islands.”

Waterfowl and Waterbird Production - Although waterfowl production is generally low on the refuge, especially compared with other refuges of the Complex, it harbors a variety of colonial nesting waterbirds. Species include Caspian terns, California and ring-billed gulls, great blue heron, great egrets, and double crested cormorants. Recent investigations by Point Reyes Bird Observatory suggest that the refuge represents one of the last breeding colonies for California gulls in the state of California (D. Shuford, Point Reyes Bird Observatory, pers. comm.)

Preservation of Biological Diversity - The upland areas of the Clear Lake “U” are managed to maintain a diversity of plants and wildlife species. Sage grouse populations on the Clear Lake “U” represent one of the last populations in this area of the Klamath Basin. Efforts to find leks on areas outside the refuge during the springs of 1993 and 1994 have been unsuccessful. Shoreline habitats on the refuge support a variety of forbs crucial to survival of females and broods during the spring and summer. 10-20 males are counted on the refuge lek during the spring breeding season each year.

Environmental Impacts

Proposed Action Alternative - Under this alternative, no draw down or lowering of Clear Lake would be needed to accommodate the construction of the RCC structure. Operation of Clear Lake Dam would not be changed to accommodate the construction of the RCC structure. Lake elevations expected during construction period (proposed to occur from November 2000 through mid-to-late 2001) would not result in land bridging any islands. However, this is an issue related to long-term operation of Clear Lake Dam and will be addressed in the Klamath Project EIS. During construction of the RCC structure, no adverse impacts to the biological resources of Clear Lake National Wildlife Refuge are expected. When the SOD project is completed, the ability to store water above the single season needs of irrigation users would allow water to be available in certain years for delivery to Tule Lake and Lower Klamath Lake National Wildlife refuges during the summer and fall period, benefitting millions of waterfowl and other waterbirds that use the refuges.

No Action Alternative - Under this alternative, the biological resources of the refuge would be adversely affected because Clear Lake would be lowered as a result of an elevation restriction, or it would return to its pre-dam levels if the dam failed. White pelican nesting islands in the lake would be adversely affected. Impacts to white pelicans would be similar to those that occurred during the drought year of 1992, when Clear Lake was at 4522 feet elevation during nesting. Land bridging of islands allows predators such as coyotes to enter nesting colonies thereby causing either total nest abandonment or severely reduced production. Under this alternative, if nesting islands are land-bridged before nesting begins, many breeding birds would not nest until conditions improve with higher water levels and the islands reappear.

IRRIGATION USE AND FLOOD CONTROL

Description of the Affected Environment. The Langell Valley and Horsefly Irrigation Districts receive a major portion of their irrigation water from Clear Lake. Irrigation releases are made to the districts from May through October. In mid-October, releases are ended from November through April. Annual direct irrigation deliveries from Clear Lake in the period 1962 to 1997 ranged from just under 8,000 acre-feet to over 43,000 acre-feet with average annual irrigation deliveries being 34,560 acre-feet. Cropping patterns in the irrigated areas consist of irrigated pasture (50%), alfalfa (41%), and barley (9%) in the Langell Valley Irrigation District; and alfalfa (73%), irrigated pasture (18%), and barley (9%) in the Horsefly Irrigation District. Irrigation benefits are estimated to be \$501,000 annually based upon an irrigated area of 10,896 acres.

Clear Lake Dam provides flood protection for reclaimed land in the Tule Lake Basin. The total area that would be flooded without the drainage and run-off control provided by Clear Lake Dam has been estimated to be 17,500 acres. These lands are currently under cultivation growing potatoes, alfalfa, sugar beets, and small grain crops, as well as some pasture. The annual loss of benefits has been estimated to be approximately \$1,907,500 if these lands were allowed to be flooded.

This shallow turbid reservoir has one major tributary, Willow Creek. Stream flows supplied primarily by snowmelt and rain in this creek are highly variable both on a seasonal and annual basis. Peak flows typically occur in the late winter to early spring and by midsummer flows are very low.

Environmental Impacts

Proposed Action Alternative - This alternative would result in no impacts to irrigation or flood control. No reservoir draw down or loss of water storage would occur as a result of this alternative. Irrigation water deliveries would be uninterrupted under this alternative. Project irrigation benefits would be unchanged and the flood control benefits would be unaffected.

No Action Alternative - This alternative would result in the loss of irrigation deliveries and a resultant loss of an irrigation benefit of up to \$501,000 annually. This would result from loss of most or all of the irrigation water supply stored in Clear Lake. Without irrigation deliveries, project lands would likely revert to dryland grazing. This alternative would result in an annual loss of up to \$1,907,500 in flood control benefits provided by Clear Lake Dam. Up to 17,500 acres in the Tule Lake area could be adversely affected without the flood control provided by Clear Lake Dam. Depending upon hydrological conditions and spring runoff, more water would be flowing down the Lost River than could be accommodated by the Klamath Project. At a minimum, the lease lands on the Tule Lake National Wildlife Refuge would be flooded. The Lost River could be expected to overflow its banks, flooding any nearby homes or businesses. The towns of Bonanza, Merrill and possibly Tulelake would experience flooding. Flooding at other times would be less severe if Project facilities could route Lost River water to the Klamath River.

OTHER RESOURCES AND ISSUES

Bats - A series of small caves exist immediately downstream from the right abutment of the dam in a low basalt cliff adjacent to the Lost River floodplain. These caves were surveyed for presence of bats (Reclamation 1999e). No bats were observed during the survey. There may only be intermittent seasonal, temporary use of the caves by bats for daytime roosting. No evidence of a maternity colony were found in the survey. The caves would not be directly impacted by the

proposed action alternative. There would be indirect effects resulting from construction and human activity for the duration of the project. Other suitable roosting sites would be available during the project.

Indian Trust Assets - Indian trust assets are defined as legal interests in property held in trust by the United States for Indian tribes or individuals, or property that the United States is otherwise charged by law to protect. The United States has a trust responsibility to protect and maintain rights reserved by or granted to American Indians or Indian individuals by treaties, statutes and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that all federal agencies take all actions reasonably necessary to protect this trust. Reclamation policy states that it will carry out its activities in a manner which protects these assets and avoids adverse impacts when possible. When impacts cannot be avoided, Reclamation will provide appropriate mitigation or compensation. Assets can be real property, physical assets, or intangible property rights. Examples of trust assets are lands, minerals, hunting and fishing rights, and water rights.

The United States entered into a treaty with the Klamath and Modoc Tribes and the Yahooskin Band of the Snake Indians (Klamath Tribes) in 1864. This treaty reserved to the Klamath Tribes “fishing, hunting and gathering rights on lands that were formerly part of the original Klamath Indian Reservation in Oregon” (Nawi 1995:4). Clear Lake, located in northern California lies outside the former reservation. The treaty also provided for “water rights in off-reservation areas to the extent necessary to support a tribal fishery within the original reservation” (Nawi 1995:5). The Lost River and Klamath Lake drainages are separated. The Klamath Tribes treaty does not pertain to Clear Lake and there are no tribal trust assets at Clear Lake. The **Proposed Action Alternative** would result in no adverse impact on Indian trust assets. No mitigation for adverse impacts would be needed. Reclamation will continue its consultation with the Bureau of Indian Affairs and Klamath Tribes regarding potential impacts on trust assets.

Environmental Justice - Executive Order 12898 established environmental justice as a federal agency priority to ensure that minority and low-income groups are not disproportionately affected by federal actions. The majority of residents in the project area are English-speaking but there is a Native American population located with the Klamath Basin area. The proposed project does not involve major facility construction, population relocation, health hazards, hazardous waste, property takings or substantial economic impacts. The proposed project would not have an adverse human health or environmental effect on minority and low-income populations as defined by environmental justice policies and directives. The **Proposed Action Alternative** would not disproportionately affect any low-income or minority communities.

Short- and Long-term Impacts - The **Proposed Action Alternative** would result in short-term impacts such as loss of vegetation from construction-disturbed areas; displacement of wildlife away from areas of human activity necessary to construct the RCC structure; temporary increases in water turbidity resulting from construction activity; loss of recreation opportunity at the immediate vicinity of the project area during construction and temporary employment of construction workers. The proposed project would result in long-term impacts such as loss of vegetation and soil where the RCC structure would be constructed.

Irreversible and Irrecoverable Resource Commitments - The **Proposed Action Alternative** would result in no irreversible resource commitments. There would be an irretrievable loss of vegetation and soil resulting from construction of the RCC structure.

Unavoidable Adverse Impacts - The **Proposed Action Alternative** would result in an unavoidable adverse impact of loss of vegetation and disturbance of soils due to construction activities.

Cumulative Impacts - The **Proposed Action Alternative** would reduce the likelihood of extremely low lake elevations. The proposed action alternative would result in Reclamation being able to store water in Clear Lake above elevation 4537.4 from October 1 to March 1. Storage is presently restricted to 4537.4 because of Safety of Dams deficiencies. Storage above 4537.4 would provide increased probability that more water could be carried over from year-to-year. Clear Lake would likely drop less in elevation during dry years. The likelihood of extremely low lake levels that could adversely affect the biological resources of the lake and Lost River would be lessened. During the 1992 drought, Clear Lake dropped to extremely low levels, exposing important cultural resources. Reclamation, working with the Klamath Tribes, covered an exposed cemetery to protect it. The cumulative impact of the Proposed Action Alternative is to provide additional protection for cultural resources under the lake. No other activities are known that affect cultural resources. It would result in beneficial impacts to endangered fish when combined with other activities being conducted within Klamath River basin. An activity that affects the endangered suckers is riparian fencing that keeps livestock out of the important Lost River sucker spawning tributaries. The Proposed Action Alternative would reduce the risk of extremely low lake levels, the fencing is a positive cumulative impact. The U.S. Fish and Wildlife Service manage the refuge for maximum protection of the breeding birds through various activities. The Proposed Action Alternative would not impact these activities or cause any cumulative impacts to the refuge resources. The Klamath Project provides both irrigation deliveries and flood control benefit through out the project area. Several facilities, besides Clear Lake Dam provide these benefits. However, there are no foreseeable changes to any of these facilities that added to any of the construction alternatives would cumulatively impact irrigation deliveries or flood control benefit.

Interrelated and Interdependent Activities - The proposed project is related to other Safety of Dams investigations being conducted by Reclamation for other facilities of the Klamath Project, specifically Gerber Dam and Link River Dam. Those Safety of Dams investigations are not related time-wise and are not contingent on Clear Lake Dam. Clear Lake Dam is an authorized facility of the Klamath Project. The operation of Clear Lake Dam is related to the operation of the Klamath Project, for which an EIS is currently prepared on its long-term operations plan. That EIS is projected to be completed by the end of 2000. It will address the operation of Clear Lake Dam and other facilities of the Klamath Project. There are other studies and planning efforts being conducted regarding the Klamath Project and water resources of the upper Klamath River basin that are related because of the geographical proximity of the Klamath River and Lost River basins, but are contingent upon or dependent on the proposed action. The proposed project (modifying Clear Lake Dam to correct its safety deficiencies) is not interdependent with any other existing or proposed project or activity.

SUMMARY OF ENVIRONMENTAL IMPACTS

The environmental impacts of the alternatives are summarized in Table 3.2.

**Table 3.2 - Summary of Impacts
Clear Lake Dam Safety of Dams EA**

Resource Issue	Impacts of Alternatives	
	Proposed Action	No Action
1. Cultural Resources	No impact on archaeological resources if sites are found ineligible for the NRHP. There would be an adverse impact on Clear Lake Dam.	Adverse effect on cultural resources downstream from dam along the Lost River due to flood scouring (resulting from dam failure). Sites presently underneath Clear Lake exposed to vandalism and looting.
2. Threatened and Endangered Species	Threatened or endangered fishes in the Lost River or Clear Lake would be affected. Fish screen incorporated into RCC structure design or mesh barrier net re-installed to prevent entrainment of suckers. Mitigation measures implemented to avoid or minimize construction-related effects on suckers and proposed critical habitat.	Adverse effect on endangered fishes resulting from lowering of lake and possible dam failure. Lowering the lake or dam failure would result in fish being concentrated into either a smaller lake area or entrained out of Clear Lake during drainage. The entrained fish either will die or compete with downstream resident fish for food and space.
3. Wetland and Riparian Areas	0.9 acres of palustrine emergent wetland impacted. Mitigation implemented to fully offset this impact.	Wetlands and riparian areas downstream from the dam and around the existing perimeter of the lake would be adversely affected or lost due to lake lowering or dam failure.
4. Livestock Grazing	Construction activity would likely disturb livestock grazing on about 28 acres in the immediate vicinity of the dam for the duration of the construction. Construction-related traffic on access road would increase the possibility of livestock hit by vehicles. Access across dam and through the SOD construction zone would be maintained for authorized traffic, including grazing permittees.	Access across the dam would be closed due to dam failure. Loss of grazing capacity along Lost River due to lowered lake elevation.
5. Clear Lake National Wildlife Refuge	No adverse impacts on the biological resources of Clear Lake National Wildlife Refuge. Nesting islands for white pelicans and other waterbirds would not be land bridged as a result of the proposed action. Clear Lake would not be lowered.	Refuge resources would be adversely affected by either failure of the dam or reduced elevation of Clear Lake. Nesting islands in the lake could be adversely affected. If nesting islands are land-bridged before nesting begins, many breeding birds will not nest until conditions improve with higher water levels and the island reappears.

<p>6. Irrigation Use and Flood Control</p>	<p>No impacts on irrigation water deliveries or flood control benefits.</p>	<p>Irrigation water supply and flood control would be adversely affected by either dam failure and reduced elevation of Clear Lake. Dam failure before or during the irrigation season, deliveries would be curtailed while the dam was being repaired. If the dam fails after the irrigation season and the dam is repaired before the irrigation season, the irrigation deliveries would not be affected. Depending on when failure occurred, down river flooding could be very severe.</p>
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